

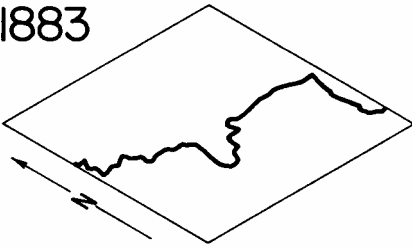
## **Chapter B**

### **Completions Near San Carlos Reservation**

**B2**

## History of Surveys

1883

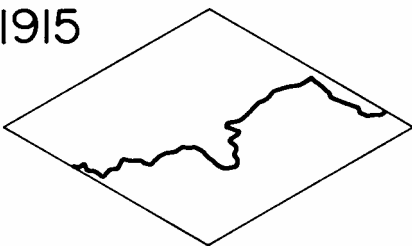


**1875** T.F. White established the southwest corner of T. 3 S., R. 24 E.

**1883** Paul Riecker surveyed the south boundary of the White Mountain Indian Reservation, also known as the San Carlos Indian Reservation.

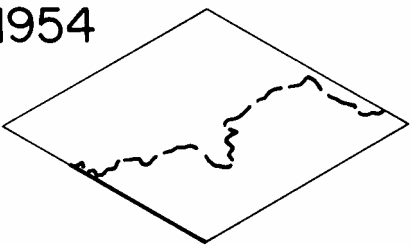
Riecker ran a line due north through the flagstaff at Camp Goodwin, to the summit of the Gila Mountains. The south boundary of the reservation was to then follow the summit of the Gila Mountains southeasterly to 109° 30' west longitude.

1915



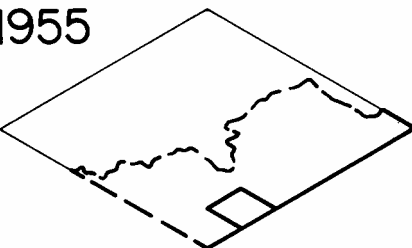
Riecker's field notes state that he could not survey along the impassable summit of the mountains so he erected monuments on prominent peaks and points along the ridge top, measured base lines in the flats to the north and, by triangulation, computed the courses and distances along a major portion of the boundary.

1954



Riecker's work was later held to be unsatisfactory and resurvey was ordered.

1955

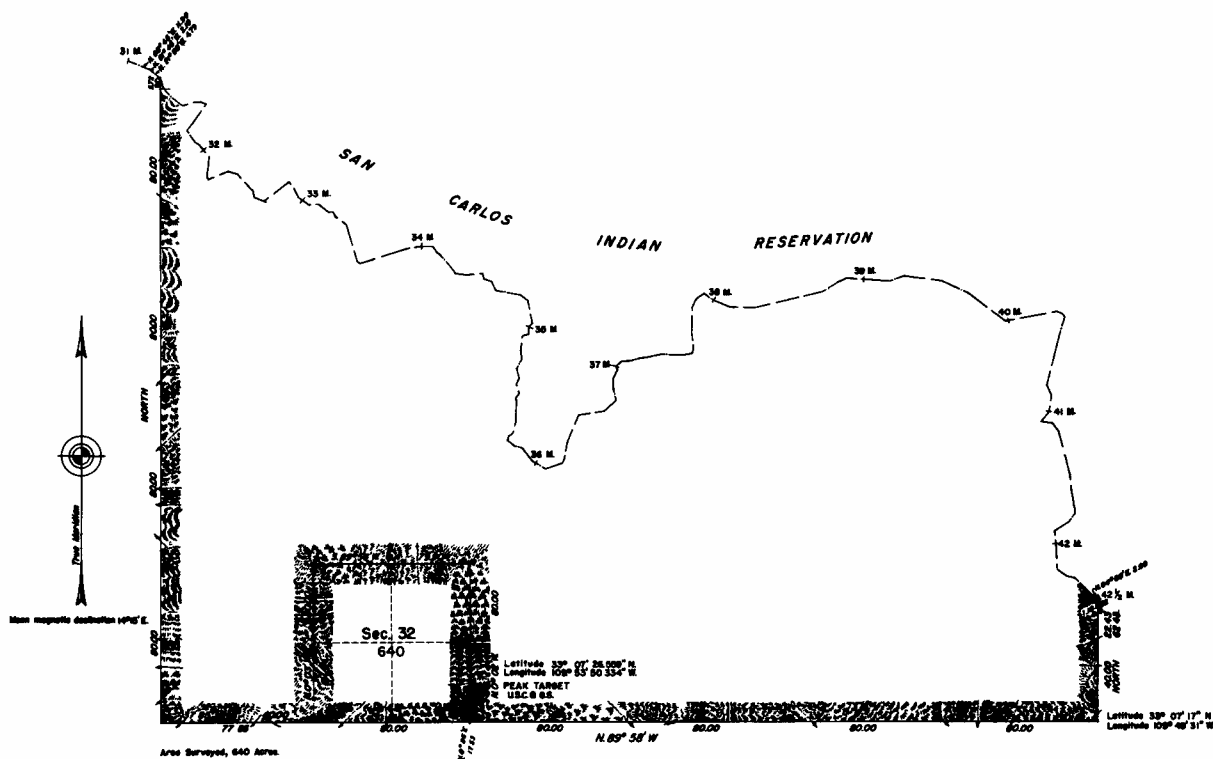


**1915** H.L. Baldwin resurveyed the south boundary of the San Carlos Reservation from one mile south of Camp Goodwin to the summit of the Gila Mountains and southeasterly along the summit to the southeast corner of the reservation. Baldwin's resurvey mentions the Riecker monuments, where found, but the resurvey along the summit was independent of them. Baldwin ran a traverse line along the summit, setting mile and half mile corners monumented with iron posts. Along the portion of the boundary through range 24 east, Baldwin did not monument any of his angle points, except as they were also a mile or half mile corner,

**1954** D.E. Harding surveyed the west boundary of T. 3 S., R. 24 E., G. & S.R.M.

**1955** D.E. Harding and F.R. Chappell surveyed the south and east boundaries of T. 3 S., R. 24 E., and section 32. See figure I.

**TOWNSHIP 3 SOUTH, RANGE 24 EAST, OF THE GILA AND SALT RIVER MERIDIAN, ARIZONA.**



**Figure 1 - Original Plat**

### Reasons for Request of this Survey

The Safford, Arizona, District Manager requested this survey for BLM administrative purposes.

### Special Instructions

On September 15, 1961, Special Instructions were written and approved providing for the completion survey of townships 3 south, ranges 23, 24 and 25 east, G.&S.R.M., under Group No. 363, Arizona. This case is concerned with T. 3 S., R. 24 E. only.

## Conditions Found on the Ground

The surveyors assigned to conduct this completion survey -found errors in the 1954-55 surveys of the boundaries and could not close against them within the limits set by the Manual of Surveying Instructions, 1947. They retraced the west, south, and east boundaries. The east boundary was 0.55 chains longer than record. The south boundary was defective in alinement but not defective in measurement when taken overall, or on the average. The west boundary was within limits for alinement but defective in measurement when the errors were taken accumulatively from the southwest corner of the township. The surveyed section 32 was within limits.

Four portions of the San Carlos Reservation boundary were found defective. See figure 2.

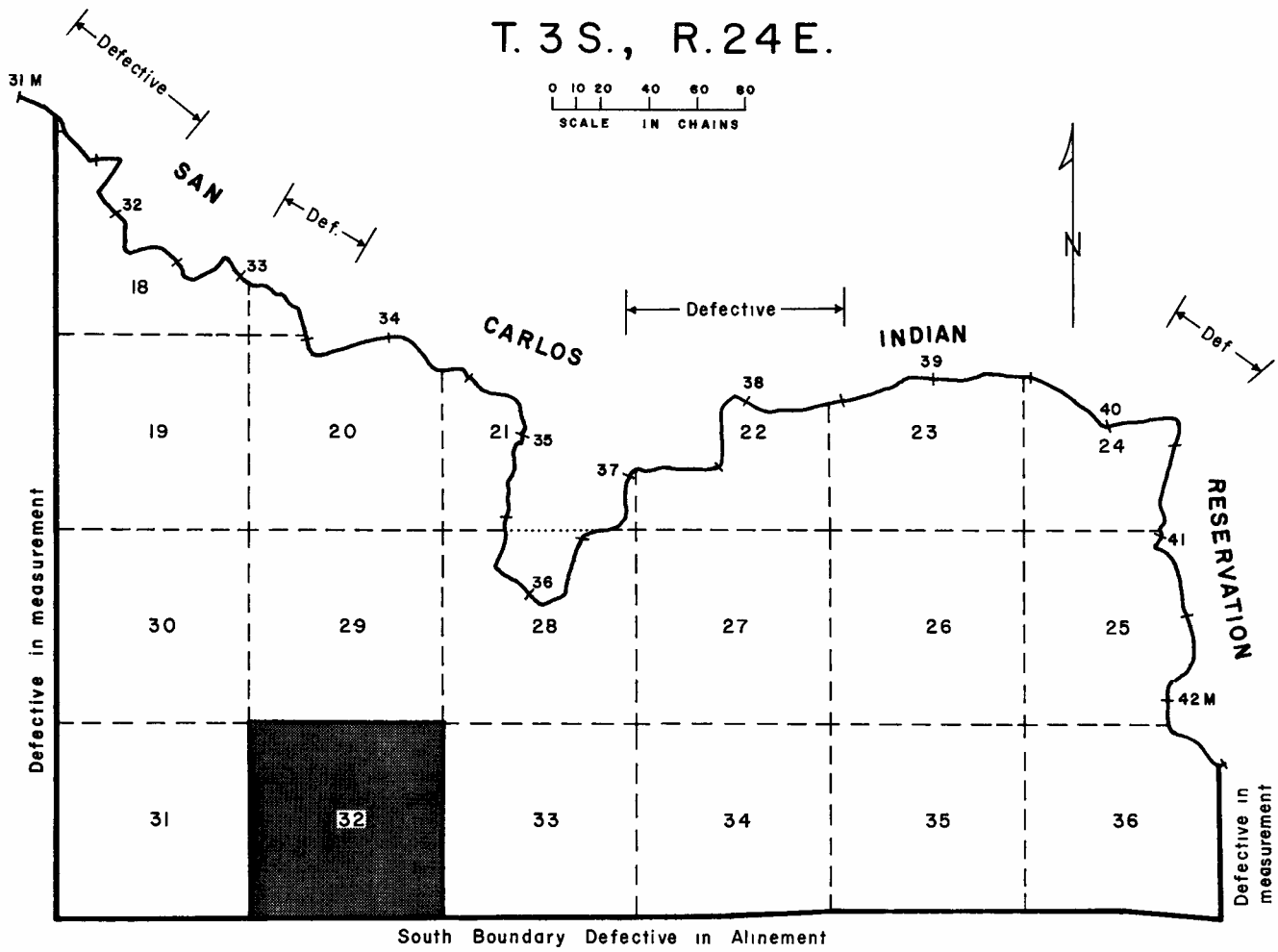


Figure 2 - Defects

The following are abstracted from Baldwin's field notes:

From the 31 mile corner:

Thence along the summit of the Gila range of Mountains and 32nd mile of the S. bdy. of the White Mountain (or San Carlos) Indian Reservation.

Ascending

S. 68° 45' E.,	11.90	chs.	
S. 51° 45' E.,	2.10	"	
S. 51° E.,	5.00	"	Descending to low point Ascend
S. 16° ¼ ° E.,	4.60	"	
S. 31° E.,	3.40	"	To top of high pinnacle on ridge, brs. SE. and NW.
S. 51° E.,	7.70	"	
N. 81° 45' E.,	2.00	"	Set an iron post... for 3 ½ mile corner... Cor. falls bet. two large boulders, or rather a crack in rock, on 1st pinnacle West of peak at south end of ridge leading north, about 3.00 chs. W. of the saddle bet. this peak and pinnacle... Thence descending
N. 74 ¼ ° E.,	3.20	chs.	Thence ascending
East	4.70	"	
S. 71° E.,	2.70	"	
<hr/>			
S. 38 ½ ° W.,	.80	"	At 16 lks. - Probable old Monu- ment No.3, but no marks can be discerned on surrounding rocks. Thence steep descent.
S. 36° W.,	10.70	chs.	
S. 39° 45 'W.,	4.70	"	
S. 35 ½ ° E.,	7.20	"	
S. 54° 45' E.,	2.50	"	

S. 43 ° E.,	3.50	"	Set an iron post for 32 mile comer and angle point on bdy.,.... Cor. falls on SE. slope 1/8 mile N. of brushy peak.
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Note: Some of the mile and half mile comers heretofore fallen at angle points of the boundary and some on straight portions thereof. Therefore, I will hereafter distinguish between such by markings on posts and bearing trees, adding the letters AP at angle points, and omitting same when cor. falls on straight portion of the boundary.

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From the 33 mile corner:

Thence along summit of the Gila range of mountains....

Ascending

S. 55° 15' E.,	4.10	chs.	
N. 85 ° E.,	5.00	"	
S. 51° E.,	6.50	"	
N. 83 ° 45' E.,	2.30	"	
S. 27 ° 45' E.,	2.30	"	
S. 51 ¼ ° E.,	7.00	chs.	to highest point of hill. De- scend along narrow broken ridge.
S. 17 ° 30' E.,	12.80	chs.	Set an iron post for 33 ½ mile comer . Cor. falls about 3 ft. W. of rock ledge -the 1st one east of saddle before ascent to high peak. A very large amphitheater falls off abruptly to the west.

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From the 37 mile corner:

Thence I run along the summit of the Gila range of  
Mountains.....

N. 50 ° E.,	3.90	chs..	to top of rocks. From this point.....
N. 87 ½ ° E.,	2.10	"	To top of rock ledge
N. 82° E.,	2.90	"	" " "
N. 75 ° E.,	3.90	"	
N. 81 ° 45' E.,	3.70	"	
<u>N. 78 ½° E..</u>	8.50	chs..	

S. 88 ¼ ° E.,	10.70	"	Thence descend.
N. 78 ½ ° E.,	1.40	"	
N. 82 ½ ° E.,	2.90	"	Set an iron post.... for 37 ½ mile cor., also angle point,.... Cor. falls about 2.00 chs. E. of top of knoll.
N. 13 ½ ° E.,	2.60	chs.	Descending.
N 7 ½ ° W	7.90	"	Point in saddle bet. drains E. and W. Wire fence brs. E. and W. Ascend.
N. 1° 10' E.,	13.50	chs.	
N. 23 ¼ ° E.,	3.80	"	To top of hill. Thence descend.
N. 41 ½ ° E.,	2.50	"	
N. 53 ° 45 ' E.,	3.50	"	
S. 50 ½ ° E.,	2.50	"	
S. 55 ½ ° E.,	3.70	"	Set an iron post.... for 38 mile cor., also angle point....

Cor. falls on flat ridge gradually descending to E.

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Thence along summit of the Gila range of mountains ....  
Continuing descent.

S. 68° E.,	8.80	chs.	
S. 88 ½° E.,	12.80	"	
N. 77° E.,	18.40	"	At 13.00 chs. - foot descent. Thence ascend. Set an iron post.... for 38 ½ mile cor..... Cor. falls in saddle 4.00 chs. W. of foot of rock ledge on volcanic knoll.

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From the 40 mile corner:

Thence I run along the summit of the Gila range of mountains,  
which at this place is flat prairie land ....

N. 79 ° 30 ' E.,	25.00	chs.	At 7.00 chs. on this course,
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trail brs. N. and S. Ascend.

S. 67° 30 ' E.,	3.50	"	
S. 33 ¼ ° E.,	2.30	"	Thence descend.
S. 14 ½ ° W.,	3.30	"	
S. 15 3/8 ° W.,	5.90	"	Set an iron post ....for 40 ½ mile cor. and angle point....

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At the beginning of each mile Baldwin states that his line was along the summit of the Gila range of mountains. It seems reasonable to assume that he made an effort to determine, as nearly as possible, the position of the summit and then run his traverse line in a manner similar to meandering a stream or lake. The U.S.G.S. map (Fort Thomas, 1960) shows this ridge to be sharply defined between the 31 and 39 mile corners but somewhat flat and undefined between the 39 and 42 mile corners.

### **Preliminary Statement of the Problem**

The defective surveys on the boundaries needed to be considered before a plan of completion was possible.

The retracements and resurveys of the boundaries and section 32 were computed using coordinate positions of the corners to prepare a plan. Figure 2 is a sketch of the township showing defective conditions.

A plan of completion was required to give the township the greatest possible number of "regular" sections and aliquot parts, and the least number of fractional lots and "double" corners. This is the desirable objective and follows the intent of the first sentence of section 3-66 of the Manual of Surveying Instructions, 1973.

### **Regulations**

This survey illustrates the application of the following sections of the Manual of Surveying Instructions, 1973:

3-33 to 3-45	Limits and defective exteriors
3-97 to 3-102	Fractional townships, Extension and completion surveys
5-20 to 5-24	Restoration of lost corners
5-43	Broken boundaries

### **Auxiliary Topic No.1**

Section 5-44 of the Manual of Surveying Instructions, 1973, specifically states that the "Grant Boundary" method of adjustment should be used to adjust errors in reservation boundaries which were surveyed prior to the township and section lines which close against it. The method is to be used after the natural calls are satisfied. In this case the natural calls were satisfied in three segments of the reservation boundary and no further adjustment was required. Three more



segments were adjusted by the "Broken Boundary" method, section 5-43 of the Manual of Surveying Instructions, 1973. This method is ordinarily used on nonriparian meander lines and some other metes and bounds surveys. The "Summit of the Gila Mountains" is a natural feature of the terrain, just as is the shoreline of a lake or stream. This is possibly the reason for using the broken boundary method to adjust the reservation boundary. It is also possible that the broken boundary adjustment kept the adjusted line more closely along the summit than a grant boundary adjustment would.

The Manual of Surveying Instructions, 1973, section 7-16, states in part:

Boundaries of this sort are normally winding, and it should be understood that they are technically defined by the natural feature and not by the straight lines between angle points monumented in a survey. *Northern Pacific Railway Co. v. United States*, 227 U.S. 355 (1913).

### **Final Statement of the Problem**

The surveyor will complete the survey with a minimum of fractional sections and lottings.

### **Solution**

The west boundary was resurveyed holding the 1955 survey corners for alinement but changing them to angle points, with new corners set at 40 and 80 chain intervals in latitudinal measurement. The adjacent T. 3 S., R. 23 E., was being completed under the same group and the new corners were marked for maximum control.

A sectional correction line was surveyed East from the original corner of sections 28, 29, 32 and 33, with corners established at 40 and 80 chain intervals, to a closing corner of sections 25 and 36 on the San Carlos Reservation boundary.

The lines between sections 33 and 34, 34 and 35 and 35 and 36, were surveyed random and true with the excess or deficiency placed in the south half mile. Closing corners against the defective south boundary were not required because the bearings of these lines fell within the limits of 21' of arc.

The meridional lines were surveyed northerly from the sectional correction line, parallel to a theoretical east boundary. Corners were established at normal intervals with closing corners on the San Carlos Reservation boundary. The line between sections 24 and 25 was surveyed East to a closing corner, as were the lines between sections 7 and 18 and between sections 17 and 20. The line between sections 21 and 28 was surveyed random and true with two closing corners established on the San Carlos Reservation boundary. The portion of this line inside the reservation was surveyed as a blank line. The lines between sections 18 and 19, sections 19 and 30 and between sections 30 and 31 were surveyed random and true, with the deficiency in the west half mile.

A south  $\frac{1}{4}$  section corner of section 36 was established 40 chains east of the corner of sections 1, 2, 35 and 36. The original  $\frac{1}{4}$  section corner was corrected to refer to section 1, only.

Upon closing against the south boundary of the San Carlos Indian Reservation, ties were made to the nearest mile or half mile corner and closures were computed based on the record of Baldwin's 1915 resurvey. If the fractional sections closed within limits, the reservation boundary was retraced on record courses and distances to the closing section line. The closing corners were set at the true points of intersection.

Sections 17, 18, 22 and 24 did not close within limits because of error in the reservation boundary. The reservation boundary was retraced and resurveyed between the mile corners 31 and 32, 33 and 33  $\frac{1}{2}$ , 37 and 38  $\frac{1}{2}$  and between the 40 and 40  $\frac{1}{2}$  mile corners. The following

field notes are abstracted from the field notes of T. 3 S., R. 24 E., approved February 26, 1964, and cover the portions of the boundary that were resurveyed.

Retracement of a Portion of the Survey

Executed by H. L. Baldwin in 1915

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From the 31 mile cor. on the S. bdy. of the San Carlos Indian Reservation, monumented by an iron post as described in the official record.

S. 68° 45' E., 11.90 chs. dist.

S. 51° 45' E., 2.10 chs. dist.

S. 51° E., 5.00 chs. dist.

S. 16° 15' E., 4.60 chs. dist.

S. 31° E., 3.30 chs. dist.

S. 43° 30' E., 3.40 chs. dist.

S. 51° 15' E., 9.90 chs. dist.

This dist. as originally recorded, 7.70 chs. from top of high pinnacle is in error as the original distance leaves the watershed.

N. 81° 45' E., 2.00 chs. dist.

The 31 ½ mile cor., monumented by an iron post as described in the official record.

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Thence, from the 31 ½ mile cor.

N. 74° 15' E., 3.20 chs. dist.

East, 4.70 chs. dist.

S. 71° 00' E., 2.70 chs. dist.

S. 38° 30' W., 0.80 chs. dist.

S. 36° 00' W., 10.70 chs. dist.

S. 39° 45' W., 4.70 chs. dist.

S. 35° 30' E., 8.20 chs. dist.

This distance is officially recorded as 7.20 chs., which is in error as it lacks a chain of reaching to top of the ridge.

S. 54° 45' E., 2.50 chs. dist.

S. 43° 00' E., 3.50 chs. dist.

The 32 mile cor., monu-

mented by an iron post  
as described in the official record.

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From the 33 mile cor. on the S. bdy. of the San Carlos  
Indian Reservation, monumented by an iron post as  
described in the official record.

With adjusted traverse to the 3 ½ mile cor.

S. 55° 43' E., 4.10 chs. dist.

N. 84° 35' E., 5.02 chs. dist.

S. 51° 27' E., 6.49 chs. dist.

N. 83° 22' E., 2.31 chs. dist.

S. 28°09' E., 2.29 chs. dist.

S. 52° 13' E., 6.99 chs. dist.

S. 17° 50' E., 12.72 chs. dist.

The 33 ½ mile cor.,  
monumented by an iron  
post as described in  
the official record.

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From the 37 mile cor. on the S. bdy. of the San Carlos  
Indian Reservation, monumented by an iron post as  
described in the official record.

N. 50° E., 3.90 chs. dist.

N. 87° 30' E., 2.10 chs. dist.

N. 82° E., 2.90 chs. dist.

N. 75° E., 3.90 chs. dist.

N. 81° 45' E., 3.70 chs. dist.

S. 78° 30' E., 8.50 chs. dist.

This course as originally  
recorded was N. 78°  
30' E., which leaves the  
summit of the mountains.

S. 88° 15' E., 10.70 chs. dist.

N. 78° 30' E., 1.40 chs. dist.

N. 82°30' E., 2.90 chs. dist.

The 37 ½ mile cor.,  
monumented by an iron  
post as described in

the official record.

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With adjusted traverse from the 37 ½ mile cor.

N. 12°24' E., 2.60 chs. dist.

N. 8° 30' W., 7.96 chs. dist.

N. 0°07' E., 13.56 chs. dist.

N. 22° 10' E., 3.79 chs. dist.

N. 40° 30' E., 2.48 chs. dist.

N. 54°56' E., 3.46 chs. dist.

S. 50°02' E., 2.46 chs. dist.

S. 55°03' E., 3.62 chs. dist.      The 38 mile cor.,  
monumented by an iron  
post as described in  
the official record.

S. 67°57' E., 8.83 chs. dist.

S. 88°23' E., 12.84 chs. dist.

N. 77° 10' E. 18.45 chs. dist.      The 38 ½ mile cor.,  
monumented by an iron  
post as described in  
the official record.

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From the 40 mile cor. on the S. bdy. of the San Carlos  
Indian Reservation, monumented by an iron post as  
described in the official record.

With adjusted traverse to the 40 1/2 mile cor.

N. 79° 30' E., 25.24 chs. dist.

S. 67°48' E., 3.53 chs. dist.

S. 33° 45' E., 2.31 chs. dist.

S. 13° 59' W., 3.29 chs. dist.

S. 14° 53' W., 5.88 chs. dist.      The 40 ½ mile cor.,  
monumented by an iron  
post as described in  
the official record.

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The seventh course from the 31 mile corner was found to be 2.00 chains in error. In conformity with section 5-23 of the Manual of Surveying Instructions, 1973, this two chain mistake was placed where it occurred. The ridge top is sharply defined at this point and if the course were held at the record 7.70 chains, the last course would not reach the 31 ½ mile corner and would be off the ridge. It was manifest where the mistake occurred.

The seventh course from the 31 ½ mile corner was in error by 1.00 chain, evidenced also by the summit of the Gila Mountains.

The sixth course from the 37 mile corner was mistaken in bearing. Instead of N. 78° 30' E., it was clear that the bearing had to be S. 78° 30' E., for the line to remain on the ridge top and fit the monuments on the ground.

After the obvious blunders were placed where they occurred, no further adjustments had to be made in those three portions of the reservation boundary. No surplus or deficiency remained to be proportioned.

In the segments between the 33 and 33 ½, 37 and 38 ½, and between the 40 and 40 ½ mile corners the error in closure could not be isolated into any specific course or courses. These segments were retraced on the record bearings and distances and the misclosure measured to the extant mile or half mile posts. The misclosure was then adjusted into the courses by the broken boundary method, section 5-43 of the Manual of Surveying Instructions, 1973.

After the necessary retracements and adjustments were made, the section closures were again computed. All fell within limits. The closing corners were then established at the intersections of the section lines and the adjusted boundary.

A triangulation station, "Peak Target," was located in section 33. A direct tie was made to that station. From the published geodetic coordinates of this station the latitude and longitude of the southeast corner of the township was computed. The field work was thus completed. The field notes were written and the plat prepared. Figure 3 illustrates the accepted plat.

Two mistakes appear on the plat of T. 3 S., R. 24 E:

1. The sixth course from the 37 mile corner is shown on the plat as N. 78 ° 30' E., which is the Baldwin record of this course. The 1961 resurvey notes say this course is S. 78° 30' E., and explain the change. The plat is incorrect.
2. The segments of the reservation boundary from the 33 to 33 ½, 38 to 38 ½, and 40 to 40 ½ mile corners were adjusted by the broken boundary method. A recomputation of these segments proves the adjustments to be correct by that method. The segment from the 37 ½ to 38 mile corner is incorrectly given in both field notes and on the plat. As given, the courses and distances do not check by any known method of adjustment and must be in error. The mistake is probably in the 6<sup>th</sup> course, given as "N. 54° 56' E., 3.46 chains dist." All of the other courses in the segment are given an adjustment in bearing to the left. The sixth course is given an adjustment in bearing to the right.

No lines closed against the erroneously adjusted course between the 37 1/2 and 38 mile corners. The intervening angle points between the mile and half mile corners are not monumented. Any closing corner established against the reservation boundary is subject to amendment if another resurvey finds them to be not actually on the boundary.

# TOWNSHIP 3 SOUTH, RANGE 24 EAST, OF THE GILA AND SALT RIVER MERIDIAN, ARIZONA. COMPLETION SURVEY

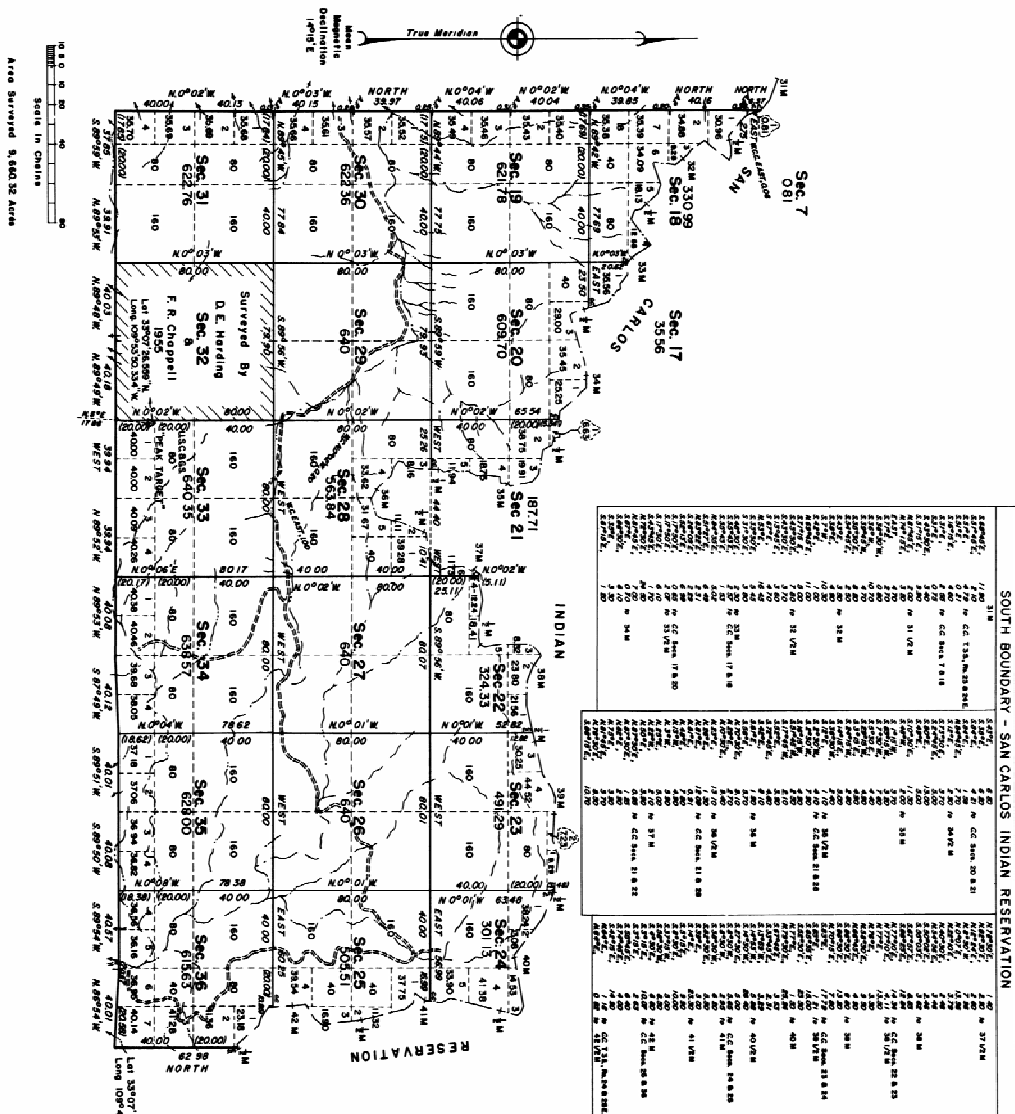


Figure 3 - Accepted Plat

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
Washington, D. C.  
February 26, 1964

THIS PLAT is hereby confirmed to the approved field notes, and the survey, having been correctly executed in accordance with the requirements of law and the regulations of this Bureau, is hereby accepted.

For the Director

*[Signature]*  
Chief, Division of Engineering

History of earlier surveys is contained in the field notes.

This plat represents a second survey of the south boundary and a portion of the south boundary of the San Carlos Indian Reservation and a survey to complete the subdivision of the San Carlos Indian Reservation, R. 24 E., T. 3 S., R. 24 E., Gila and Salt River Meridian, Arizona, executed by March 12 to April 16, 1960, under contract No. 15-60, for Group No. 363, Arizona.

**SOUTH BOUNDARY - SAN CARLOS INDIAN RESERVATION**

31 M	11.80	S 68°45'E,	6.80	6.80	N 78°30'E,	1.40
	2.10	S 51°45'E,	6.80		N 82°30'E,	2.50
	4.79	S 84°0'E,	4.21	to C.C. Secta. 20 & 21	N 12°24'E,	2.80
	0.21	S 91°0'E,	1.59		N 8°30'W,	7.56
	4.60	S 12°0'E,	2.30	to 34 1/2 M	N 0°07'E,	13.56
	2.50	S 73°30'E,	3.70		N 22°10'E,	3.79
	0.75	S 2°45'E,	5.00		N 40°30'E,	2.46
	3.40	S 80°0'E,	13.00		N 54°56'E,	2.46
	9.90	S 49°0'E,	5.00		S 50°02'E,	2.46
	2.00	S 10°30'E,	11.30	to 35 M	S 55°03'E,	3.62
	3.20	S 48°0'W,	2.00		S 67°57'E,	6.83
	4.70	S 1°15'W,	3.70		S 88°23'E,	12.84
	2.70	S 63°15'W,	3.30		N 77°10'E,	4.34
	0.80	S 7°30'W,	7.80		N 77°10'E,	4.11
	10.70	S 59°30'E,	4.40		N 78°0'E,	13.50
	4.70	S 29°15'W,	4.80		N 58°30'E,	3.30
	8.80	S 3°15'E,	4.30		N 66°45'E,	6.80
	2.50	S 24°15'W,	2.80		N 86°30'E,	13.20
	3.30	S 14°15'E,	5.00		S 86°30'E,	13.20
	4.30	S 36°30'W,	2.40	to 35 1/2 M	N 70°15'E,	7.80
	10.30	S 12°0'E,	1.10	to C.C. Secta. 21 & 28	S 83°0'E,	17.79
	1.00	S 2°30'W,	4.10		S 83°0'E,	1.21
	5.00	S 24°30'W,	7.90		S 63°35'E,	15.00
	7.80	S 81°45'W,	4.80		S 48°30'E,	23.50
	3.70	S 17°45'W,	3.10		N 77°0'E,	1.50
	3.60	S 32°0'E,	3.30		N 79°30'E,	25.84
	4.70	S 72°45'E,	4.60		S 67°48'E,	3.53
	16.45	S 42°0'E,	6.10	to 36 M	S 33°45'E,	2.31
	5.45	S 81°0'E,	1.50		S 13°59'W,	3.29
	3.80	S 58°0'E,	5.70		S 14°53'W,	5.86
	2.30	N 70°30'E,	9.10		S 14°50'W,	26.40
	2.57	N 29°0'E,	2.70		S 27°30'E,	5.00
	1.53	N 10°30'E,	9.40	to 36 1/2 M	S 29°30'E,	5.63
	5.02	N 23°0'E,	13.10		S 30°30'W,	2.95
	6.49	N 29°0'E,	1.30		S 38°30'W,	6.20
	2.31	N 81°0'E,	0.91	to C.C. Secta. 21 & 28	S 62°30'E,	5.50
	2.29	N 48°0'E,	7.80		S 39°0'E,	5.00
	6.99	N 13°0'E,	4.50		S 14°0'E,	23.30
	2.07	N 3°0'E,	5.90		S 8°15'E,	9.90
	6.10	N 25°0'E,	5.00		S 30°30'E,	10.00
	1.70	N 22°0'E,	2.10	to 37 M	S 37°15'W,	5.00
	24.90	N 50°0'E,	3.90		S 56°30'W,	8.50
	7.00	N 81°30'E,	3.30		S 49°30'E,	6.80
	0.70	N 87°30'E,	0.85	to C.C. Secta. 21 & 22	S 39°15'E,	2.63
	6.10	N 62°0'E,	1.25		S 59°45'E,	6.40
	1.50	N 75°0'E,	2.30		S 74°45'E,	4.00
	3.30	N 81°45'E,	3.70		S 42°15'E,	14.50
	1.80	N 78°30'E,	8.50		N 64°0'E,	1.18
		S 88°15'E,	10.70		N 64°0'E,	0.65
						to C.C. T.33, R.24 & 28 E
						42 1/2 M

